

Key

## Wksht 2

NAME: \_\_\_\_\_

Sections 9.1 &amp; 9.2

Directions: Complete each Confidence Interval and Hypothesis Test completely.

1. We want to find out what percent of students copy homework on a regular basis. On a regular basis is defined as more than 2 times per week. We take an SRS of 300 students and find that 115 of them answered yes! Estimate the true proportion that cheat regularly with 95% confidence. Interpret your interval.

$$\hat{p} = \frac{115}{300} \quad \hat{p} \pm z^* \sqrt{\frac{\hat{p}(1-\hat{p})}{n}} = (0.32832, 0.43835)$$

We are 95% confident that the true proportion of students who copy HW is between 0.32832 and 0.43835.

2. We take an SRS of 150 16-21 year old drivers and find that 90 of them have gotten at least one speeding ticket. Find a 97% confidence interval for the true proportion. ( $z^* = 2.17$ ) Interpret your interval.

$$\hat{p} = \frac{90}{150} \quad \hat{p} \pm z^* \sqrt{\frac{\hat{p}(1-\hat{p})}{n}} = (0.5132, 0.6868)$$

We are 97% confident that the true percent of 16-21 year old drivers that have gotten at least 1 speeding ticket is between 51.32% and 68.68%.

3. How large a sample would be required if you wish to estimate the population proportion correct to within .04 with 90% confidence?

$$z^* = 1.65$$

$$n = z^* \sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$$

$$0.04 = 1.65 \sqrt{\frac{(0.5)(0.5)}{n}}$$

$$n = 426$$

4. How large a sample would be required if you wish to estimate the population proportion and have a margin of error of 3.5% and 98% confidence ( $Z^*=2.33$ )? The proportion has been known in the past to be 45%.

$$m = z^* \sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$$

$$0.035 = 2.33 \sqrt{\frac{(0.45)(0.55)}{n}}$$

$$n = 1097$$

5. Regardless of age, about 20% of American adults participate in fitness activities at least twice a week. However, as many people age, their fitness activities decrease. In a local survey of 100 adults over 40 years of age, 15 people indicated that they participated in a fitness activity at least twice a week. Do these data indicate that the participation rate for adults over 40 years of age is significantly less than the 20% figure? Perform a hypothesis test, and use a 0.05 significance level.

$$\hat{p} = \frac{15}{100}$$

$$\alpha = 0.05$$

$$H_0: p = 0.20$$

$$H_a: p < 0.20$$

$$z = \frac{\hat{p} - p}{\sqrt{\frac{p(1-p)}{n}}} = -1.25$$

$$P(Z < -1.25) = 0.1056$$

We fail to reject  $H_0$  b/c  
p-value  $\geq \alpha = 0.05$ . We have  
sufficient evidence that  
the true proportion of  
adults who exercise is  
still ~~equal to~~ equal to  
0.20.

6. A researcher is testing a new medication out on rats. The old medication claimed that only 6% of people saw serious side effects. 21 out of 200 rats that were given the medication suffered serious side effects. Is there sufficient evidence at the 0.08 level of significance to claim that the true proportion is not equal to 6%?

$$\hat{p} = \frac{21}{200}$$

$$\alpha = 0.08$$

$$H_0: p = 0.06$$

$$H_a: p \neq 0.06$$

$$z = \frac{\hat{p} - p}{\sqrt{\frac{p(1-p)}{n}}} = 2.6797$$

$$2 \cdot P(Z > 2.6797) = 0.0074$$

We reject  $H_0$  b/c  
p-value  $< \alpha = 0.08$ .

We have sufficient  
evidence that the  
true proportion  
of people w/ serious  
side effects is not  
equal to 6%.